BANCOR DEVELOPMENTS PTY LTD

TRAFFIC AND TRANSPORT INFORMATION FOR PREFERRED PROJECT REPORT IN RELATION TO PROPOSED MIXED USE DEVELOPMENT, 6 – 16 ATCHISON STREET, ST LEONARDS

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1. INTRODUCTION

1.1 Colston Budd Hunt and Kafes Pty Ltd has been commissioned by Bancor Developments Pty Ltd to prepare traffic and transport information in response to matters raised by the Department of Planning, and in authority and public submissions, regarding a proposed residential and hotel development at 6 – 16 Atchison Street, St Leonards. The site is located on the northern side of Atchison Street, between Christie Street and Mitchell Street, as shown in Figure 1.

1.2 The site is currently occupied by commercial development of some 5,000m^2, with vehicular access from Atchison Lane to on-site parking for some 60 cars.

1.3 The proposed development was originally for a 38 room hotel, 228 residential apartments, 237m^2 café and 607m^2 gymnasium. Vehicular access was proposed from Atchison Lane to on-site parking for 168 cars.

1.4 A traffic and parking report[1] was submitted with the application. The proposed development has been publicly exhibited. In a letter dated 7 December 2010, the Department of Planning has requested the following:

> ***3. Traffic***
>
> *A detailed assessment of traffic implications of the proposed development on the intersections of Atchison Lane/Christie Street and Atchison Lane/Mitchell Street should be provided.*

[1] Traffic and Parking Report for Proposed Development at 6-16 Atchison St, St Leonards, NSW. Prepared for FJMT Architects by URaP – TTW, June 2010.

- *Swept path analysis of the largest vehicle that can physically enter and exit Atchison Lane and the access driveway should be provided in accordance with the RTA's comments on the proposal.*

1.5 A number of traffic-related matters have also been raised in submissions from the Roads and Traffic Authority, Transport NSW, North Sydney Council and in public submissions. The matters raised by the three authorities are as follows:

RTA

1. *Concerns are raised at the intersection of Christie Street/ Atchison Lane with vehicles waiting to turn right from Christie Street south into Atchison Lane east blocking Christie Street northbound. Consideration should be given to physically banning the right turn with a raised central median to the satisfaction of Council. Vehicles from Christie Street south will still be able to enter the Christie Street by undertaking a U-Turn manoeuvre at roundabout intersection of Christie Street/ Chandos Street.*

   It is noted that the right turn ban may require approval from the local traffic committee and the preparation of a Traffic Management Plan (TMP).

2. *Swept path analysis to the satisfaction of DoP and Council shall be provided that the largest vehicle (i.e. 6.4m small rigid vehicle) can physically enter and exit Atchison Lane and the access driveway. Additional splays or modification of the kerb alignment may be required on Atchison Lane, connecting streets and on the access driveway.*

3. *A condition that prohibits trucks longer than a 6.4m small rigid vehicle from entering the site should be included in the DA consent.*

4. *The residential component of the proposed development should be designed so that road traffic noise from Pacific Highway is mitigated by durable materials and comply with the requirements of Clause 102 – (Impact of road noise or vibration on non-road development) of State Environmental Planning Policy (Infrastructure) 2007.*

5. *All vehicles shall enter and exit the site in a forward direction.*

6. *Off-street car parking spaces, bicycle facilities and loading docks shall be provided to the satisfaction of Council.*

7. *The layout of the proposed car parking areas, loading docks and driveway associated with the subject development (including, grades, turn paths, sight distance requirements, aisle widths, aisle lengths, loading bay dimensions and parking bay dimensions) should be in accordance with AS2890.1- 2004 and AS2890.2 – 2002 for large vehicles.*

8. *A Demolition and Construction Traffic Management Plan detailing construction vehicle routes, number of trucks, hours of operation, access arrangements and traffic control should be submitted to Council, for approval, prior to the issue of a construction certificate.*

9. *All costs associated with the proposed development shall be at not cost to the RTA.*

Transport NSW

- *Bicycle parking and facilities should be provided in accordance with the* Planning Guidelines for Walking and Cycling *(2004), and should include secure parking for residents and workers, as well as visitor parking near the main entrance of the building. Facilities, including showers and change rooms, should be provided for workers wishing to travel to the site by active transport. This could be arranged by allowing them access to the gym change rooms.*

- *It is requested that the travel packs and travel information described in the Study should be delivered in the form of a Transport Access Guide (TAG). The TAG should inform residents, hotel guests and workers of their transport options, including walking and cycling. More information on the preparation of a TAG can be found in the Active Transport Planner's Toolkit (attached).*

- *The Construction Management Plan should identify any potential impacts on the surrounding transport network and mitigation measures should be proposed. Existing pedestrian and cycle access in the surrounding area must be monitored and maintained throughout construction. Additionally, workers traveling to and from the construction site should be encouraged to use public or active transport in all possible situations.*

- *Transport NSW queries the TTM Group pedestrian survey results that record no pedestrian activity within the survey period. Further consideration of pedestrian impacts and facilities is recommended.*

North Sydney Council

1.6 The Council officers' report which was considered by Council in relation to the proposed development, and attached to Council's submission, included the following:

Council's Traffic Engineer (C Edwards-Davies) has not has the opportunity to review this proposal due to absence on leave. However the Traffic Engineer did review the previous development application DA 469/05 for a mixed use development on this site. The current proposal involves 168 on-site car spaces compared to 154 car spaces in the previous application (which was withdrawn). Both the current Major Projects proposal and DA 469/05 involve proposed vehicle entry/ exit(s) to Atchison Lane.

The Traffic Engineer had advised in a memorandum dated 15 March 2006 that the impact of that proposal (DA 469/05) on the local traffic network was not likely to be significant, with a net increase in peak hour traffic generation of the order of 48 trips, and supported the traffic and parking aspects of the proposal subject to certain amendments to the design of the vehicle access and parking including provision of on-site loading docks for 2 vehicles, namely a 10.7m heavy rigid vehicle and a 8.8m medium rigid vehicle. The requirement for provision of loading docks arose from the significant number of furniture and other delivery vehicles certain to be associated with such a large number of dwellings.

Planning comment: *The Traffic Engineer's 2006 memorandum estimated existing traffic generation of the site based on RTA guidelines of 0.8 vehicle trips for each of the 60 existing commercial car parking spaces to be 48 trips, far lower than the estimated 100 trips in the traffic and parking study accompanying the current application. In addition the project's traffic generation estimates are based on the RTA high density Metropolitan CBD rate rather than the higher RTA metropolitan sub-regional centre rate.*

In summary it is considered that the project will result in the order of 25 additional peak hour vehicle trips. While this is not itself likely to result in unacceptable impact on the local traffic system, ***the cumulative impact of excessively large mixed use developments well in excess of the planning controls, such as this proposal, would have a significant impact on the local street system.*** *It is noted that one of the inputs into the recent review of the planning controls in St Leonards was the Arup Traffic and Pedestrian Management Study (2005) which estimated traffic generation and intersection capacity on the local St Leonards street system on redevelopment within the LEP planning controls.*

The current proposal involves a level of development considerably in excess of a development generally compliant with the planning controls, as discussed elsewhere in this report.

Having regard for the comments of Council's Traffic Engineer concerning the previous proposal, if approval is contemplated, the following design amendments and conditions are required:

- *Provision of loading docks within the site for 2 vehicles, namely a 10.7m heavy rigid vehicle and a 8.8m medium rigid vehicle, designed in accordance with Australian Standard AS 2890.2 (note: the single loading dock proposed in the basement is too small);*

- *Adequate queuing space (for three cars(at the driveway entry in front the security grill as per Australian Standard AS 2890.1;*

- *An adequate number of bicycle lockers (42), bicycle rails (10) and motor cycle spaces (17) to be provided on site in accordance with Council's DCP;*

- *Design of the car park, ramps, car spaces, bicycle facilities and disabled spaces to be in accordance with Australian Standards AS 2890.1, AS 2890.3 and AS 2890.6 respectively;*

- *A Construction Management Program for the development to be approved by the North Sydney Traffic Committee prior to issue of Construction Certificate (in view of the size and scale of the proposed 31-month construction phase).*

1.7 An addendum to the Council officers' report includes the following:

Further to the report of the Executive Planner and Senior Assessment Officer, Council's Strategic Planners have reassessed the calculations in the North Sydney Residential Development Strategy (RDS) for the St Leonards area based on the scope of the height non-compliance in respect of the 6-16 Atchison Street Part 3A proposal.

The RDS currently calculates an additional 800 dwellings under the North Sydney LEP 2001 from July 2009. A re-calculation factoring in non-compliances similar to 6-16 Atchison Street would realize an additional 1800 dwellings, that is, an increase of 1000 dwellings on current projections. Such increases in population density would be unacceptable and unmanageable consequences on amenity and traffic.

1.8 Following consideration of these and other matters raised in submissions, the applicant has prepared amended plans for the development. The amended development now provides:

- a hotel with 76 rooms;
- 173 residential apartments;
- café of 238m^2;
- 222m^2 gymnasium; and
- 146 on-site parking spaces with access from Atchison Lane.

1.9 Information and responses in relation to the above matters raised in submissions, as well as in other public submissions, are presented in the following chapter.

2. TRAFFIC AND TRANSPORT INFORMATION

2.1 The information and responses are presented through the following sections:

- DoP;
- RTA;
- Transport NSW;
- North Sydney Council; and
- public submissions.

DoP

A detailed assessment of traffic implications of the proposed development on the intersections of Atchison Lane/Christie Street and Atchison Lane/Mitchell Street should be provided.

2.2 We have undertaken weekday morning and afternoon peak period intersection traffic counts at the intersections of Atchison Lane with Christie Street and Mitchell Street. Existing two-way peak hour traffic flows at these intersections are shown in Figures 2 and 3, and summarised in Table 2.1.

Table 2.1: Existing two – way (sum of both directions) peak hour traffic flows

Road	Location	Morning peak hour	Afternoon peak hour
Christie Street	North of Atchison Lane	1,155	905
	South of Atchison Lane	1,210	950
Mitchell Street	North of Atchison Lane	130	160
	South of Atchison Lane	120	145
Atchison Lane	East of Christie Street	65	65
	West of Mitchell Street	70	90

2.3 Table 2.1 shows that Christie Street carried some 900 to 1,200 vehicles per hour two-way during the surveyed morning and afternoon peak hours. Mitchell Street carried some 120 to 160 vehicles per hour two-way and Atchison Lane carried less than 100 vehicles per hour two-way.

2.4 The surveyed intersections shown in Figures 2 and 3 have been analysed using the SIDRA program. SIDRA simulates the operations of intersections to provide a number of performance measures. The most useful measure provided is average delay per vehicle expressed in seconds per vehicle. Based on average delay per vehicle, SIDRA estimates the following levels of service (LOS):

- For traffic signals, the average delay per vehicle in seconds is calculated as delay/(all vehicles), for roundabouts the average delay per vehicle in seconds is selected for the movement with the highest average delay per vehicle, equivalent to the following LOS:

0 to 14	=	"A"	Good
15 to 28	=	"B"	Good with minimal delays and spare capacity
29 to 42	=	"C"	Satisfactory with spare capacity
43 to 56	=	"D"	Satisfactory but operating near capacity
57 to 70	=	"E"	At capacity and incidents will cause excessive delays. Roundabouts require other control mode.
>70	=	"F"	Unsatisfactory and requires additional capacity

- For give way and stop signs, the average delay per vehicle in seconds is selected from the movement with the highest average delay per vehicle, equivalent to following LOS:

0 to 14	=	"A"	Good
15 to 28	=	"B"	Acceptable delays and spare capacity
29 to 42	=	"C"	Satisfactory but accident study required
43 to 56	=	"D"	Near capacity and accident study required
57 to 70	=	"E"	At capacity and requires other control mode
>70	=	"F"	Unsatisfactory and requires other control mode

2.5 It should be noted that for roundabouts, give way and stop signs, in some circumstances, simply examining the highest individual average delay can be misleading. The size of the movement with the highest average delay per vehicle should also be taken into account. Thus, for example, an intersection where all movements are operating at a level of service A, except one which is at level of service E, may not necessarily define the intersection level of service as E if that movement is very small. That is, longer delays to a small number of vehicles may not justify upgrading an intersection unless a safety issue was also involved.

2.6 The SIDRA analysis found that the unsignalised intersections of Atchison Lane with Christie Street with Mitchell Street are operating with average delays for the highest delayed movements of less than 15 seconds per vehicle or less during morning and afternoon peak periods. This represents levels of service A/B, a good level of intersection operation.

2.7 The proposed amended development will result in an increase in traffic generation of some 55 to 65 vehicles per hour two-way during peak hours. These additional traffic flows are shown in Figures 2 and 3, and summarised in Table 2.2. Traffic increases in Atchison Lane would be some 15 to 45 vehicles per hour two-way at peak times as a result of the proposed development. Increases in Christie Street and Mitchell Street would be lower at some five to 40 vehicles per hour two-way.

Table 2.2: Existing two – way peak hour traffic flows plus development traffic					
Road	**Location**	**Morning peak hour**		**Afternoon peak hour**	
		Existing	Plus development	Existing	Plus development
Christie Street	North of Atchison Lane	1,155	-	905	+5
	South of Atchison Lane	1,210	+40	950	+15
Mitchell Street	North of Atchison Lane	130	+5	160	+20
	South of Atchison Lane	120	+10	145	+15
Atchison Lane	East of Christie Street	65	+40	65	+15
	West of Mitchell Street	70	+25	90	+45

2.8 The Atchison Lane intersections have been re-analysed with SIDRA for the additional development traffic flows shown in Figures 2 and 3. The analysis found that the Atchison Street intersections would continue to operate with average delays, for the highest delayed movements, of less than 15 seconds per vehicle during peak hours. This represents level of service A/B, a good level of service.

2.9 Copies of the SIDRA output summaries for the Atchison Lane intersections are attached as Appendix A.

- *Swept path analysis of the largest vehicle that can physically enter and exit Atchison Lane and the access driveway should be provided in accordance with the RTA's comments on the proposal.*

2.10 Vehicle swept paths are being prepared by URaP-TTW and provided under separate cover.

RTA

1. *Concerns are raised at the intersection of Christie Street/ Atchison Lane with vehicles waiting to turn right from Christie Street south into Atchison Lane east blocking Christie Street northbound. Consideration should be given to physically banning the right turn with a raised central median to the satisfaction of Council. Vehicles from Christie Street south will still be able to enter the Christie street by undertaking a U-Turn manoeuvre at roundabout intersection of Christie Street/ Chandos Street.*

   It is noted that the right turn ban may require approval from the local traffic committee and the preparation of a Traffic Management Plan (TMP).

2.11 Observations made during morning and afternoon peak periods did not indicate queuing in Christie Street caused by vehicles waiting to turn right into Atchison Lane. As shown in Figures 2 and 3, the number of vehicles which turned right into Atchison Lane was low at some five to 15 vehicles per hour.

2.12 As also shown in Figures 2 and 3, the number of additional vehicles which would turn right into Atchison Lane from Christie Street would also be low, at some five vehicles per hour.

2.13 Therefore, the measures suggested by the RTA are not considered to be necessary, because:

- currently vehicles turning right into Atchison Lane do not generally cause queuing in Christie Street;
- the number of vehicles currently turning right into Atchison Lane is low; and

- with the proposed development, the number of right turning vehicles would continue to be low.

2.14 If considered appropriate by the authorities, the measure suggested by the RTA could be implemented by the authorities separately to the Part 3A application.

2. *Swept path analysis to the satisfaction of DoP and Council shall be provided that the largest vehicle (i.e. 6.4m small rigid vehicle) can physically enter and exit Atchison Lane and the access driveway. Additional splays or modification of the kerb alignment may be required on Atchison Lane, connecting streets and on the access driveway.*

2.15 This matter is discussed above in paragraph 2.10.

3. *A condition that prohibits trucks longer than a 6.4m small rigid vehicle from entering the site should be included in the DA consent.*

4. *The residential component of the proposed development should be designed so that road traffic noise from Pacific Highway is mitigated by durable materials and comply with the requirements of Clause 102 – (Impact of road noise or vibration on non-road development) of State Environmental Planning Policy (Infrastructure) 2007.*

5. *All vehicles shall enter and exit the site in a forward direction.*

2.16 These matters 3, 4 and 5 could be included as conditions of consent.

6. *Off-street car parking spaces, bicycle facilities and loading docks shall be provided to the satisfaction of Council.*

2.17 The North Sydney Development Control Plan 2002 indicates that residential development in mixed use zones should provide a maximum of 0.5 spaces per one bedroom apartment and one space per apartment with two or more bedrooms. Hotels should provide a maximum of one space per five rooms and refreshment rooms a maximum of one space per 50m^2. Recreational developments should provide one to three spaces per 100m^2.

2.18 With 173 residential apartments (including 94 studio/one bedroom apartments and 79 apartments with two or more bedrooms), a 76 room hotel, 238m^2 café and 222m^2 gymnasium, the proposed development should provide a maximum of 148 to 153 spaces. The proposed development, with 146 spaces, satisfies this requirement.

2.19 DCP 2002 indicates that parking for motor cycles should be provided at a rate of one space per 10 car spaces or part thereof. With 146 parking spaces proposed, 15 motor cycle spaces would be required. 15 motor cycle spaces are proposed in accordance with this requirement.

2.20 DCP 2002 indicates that bicycle parking should be provided at the following rates:

- one locker per three dwellings; plus
- one rail per 12 dwellings for residential visitors; plus
- one locker per 600m^2 for other uses; plus
- one rail per 2,500m^2 for visitors to other uses.

2.21 On this basis, with 4,683m^2 of other uses (including hotel, gymnasium and café), the proposed development would require 66 bicycle lockers (58 resident and eight for the other components) and 16 bicycle rails (14 for residential visitors and

two for the other uses). It is proposed to provide parking for bicycles in accordance with these requirements.

2.22 DCP 2002 indicates that a loading bay should be provided for the development, with minimum dimensions of 7.6 metres long by three metres wide, with 3.6 metres head room. The proposed loading bay is 8.5 metres long by 3.6 metres wide, with 3.6 metres height clearance, which satisfies this requirement.

2.23 The proposed parking provision for cars and bicycles, as well as provision for service vehicles, therefore satisfies Council's requirements.

7. *The layout of the proposed car parking areas, loading docks and driveway associated with the subject development (including, grades, turn paths, sight distance requirements, aisle widths, aisle lengths, loading bay dimensions and parking bay dimensions) should be in accordance with AS2890.1- 2004 and AS2890.2 – 2002 for large vehicles.*

8. *A Demolition and Construction Traffic Management Plan detailing construction vehicle routes, number of trucks, hours of operation, access arrangements and traffic control should be submitted to Council, for approval, prior to the issue of a construction certificate.*

9. *All costs associated with the proposed development shall be at not cost to the RTA.*

2.24 These matters 7, 8 and 9 could be included as conditions of consent.

<u>NSW Transport</u>

- *Bicycle parking and facilities should be provided in accordance with the* Planning Guidelines for Walking and Cycling *(2004), and should include secure parking for*

residents and workers, as well as visitor parking near the main entrance of the building. Facilities, including showers and change rooms, should be provided for workers wishing to travel to the site by active transport. This could be arranged by allowing them access to the gym change rooms.

2.25 Bicycle parking is discussed previously in paragraphs 2.20 to 2.21. Access to the gymnasium showers/change rooms will be available for employees at the hotel.

- *It is requested that the travel packs and travel information described in the Study should be delivered in the form of a Transport Access Guide (TAG). The TAG should inform residents, hotel guests and workers of their transport options, including walking and cycling. More information on the preparation of a TAG can be found in the Active Transport Planner's Toolkit (attached).*

2.26 We agree that a transport access guide should be prepared. This could be included as a condition of consent.

- *The Construction Management Plan should identify any potential impacts on the surrounding transport network and mitigation measures should be proposed. Existing pedestrian and cycle access in the surrounding area must be monitored and maintained throughout construction. Additionally, workers traveling to and from the construction site should be encouraged to use public or active transport in all possible situations.*

2.27 These matters could be addressed in a construction traffic management plan, prepared prior to construction of the development. A condition of consent could be included to address this matter.

- *Transport NSW queries the TTM Group pedestrian survey results that record no pedestrian activity within the survey period. Further consideration of pedestrian impacts and facilities is recommended.*

2.28 It appears likely that the count results in the previous traffic and parking report for the development did not include pedestrians, rather than recording no pedestrian activity.

2.29 The proposed development will improve pedestrian access in the area by providing a through site pedestrian link between Atchison Street and Atchison Lane. Pedestrian access to the building is proposed Atchison Street. Facilities for pedestrians are also discussed in the previous report in sections 3.3 and 4.4.

North Sydney Council

…the cumulative impact of excessively large mixed use developments well in excess of the planning controls, such as this proposal, would have a significant impact on the local street system.

The current proposal involves a level of development considerably in excess of a development generally compliant with the planning controls, as discussed elsewhere in this report.

Further to the report of the Executive Planner and Senior Assessment Officer, Council's Strategic Planners have reassessed the calculations in the North Sydney Residential Development Strategy (RDS) for the St Leonards area based on the scope of the height non-compliance in respect of the 6-16 Atchison Street Part 3A proposal.

The RDS currently calculates an additional 800 dwellings under the North Sydney LEP 2001 from July 2009. A re-calculation factoring in non-compliances similar to 6-16 Atchison Street would realize an additional 1800 dwellings, that is, an increase of 1000 dwellings on current projections. Such increases in population density would be unacceptable and unmanageable consequences on amenity and traffic.

2.30 However, CityPlan Services (the applicant's town planner) has estimated that an additional some 96,330m^2 commercial development could be achieved within St Leonards if the increase in yield proposed for the subject development was also applied to other sites at 75 – 83 Christie Street, 100 Christie Street, 621 Pacific Highway and 655 – 657 Pacific Highway.

2.31 This additional area would be on top of some 170 residential apartments plus 118,000m^2 commercial development which could be provided in St Leonards under Council's draft LEP.

2.32 Council's parking rate for commercial development in St Leonards is one space per 400m^2. Therefore, the 118,000m^2 permitted under the draft LEP would be permitted up to 295 spaces and the additional 96,330m^2 would be permitted up to 241 parking spaces.

2.33 Based on surveys of the traffic generation of other commercial buildings, parking spaces for the commercial development would generate some 0.2 to 0.4 vehicles per hour per space (two-way) during peak periods. On this basis, the commercial development permitted under the draft LEP, plus the additional development from the four sites in paragraph 2.30 would generate some 110 to 220 vehicles per hour two-way at peak times.

2.34 The 170 residential apartments permitted under the draft LEP controls would generate some 50 vehicles per hour two-way, based on 0.29 vehicles per hour per dwelling from the RTA's "Guide to Traffic Generating Developments".

2.35 As discussed in paragraph 2.7, the proposed development at 6 – 16 Atchison Street will result in an increase in traffic generation of some 55 to 65 vehicles per hour two-way during peak hours.

2.36 Additional two-way peak hour traffic generation would therefore be as follows:

- from existing development potential in St Leonards under Council's draft LEP (170 residential apartments plus 118,000m^2): 110 to 170 vehicles per hour;
- from proposed development: 55 to 65 vehicles per hour; and
- from the four sites in paragraph 2.30, if the increase in yield proposed for the subject site was also applied to these sites (additional some 96,330m^2 commercial): 50 to 100 vehicles per hour.

2.37 The traffic generation of development in St Leonards, including planned development plus additional development, would therefore be some 220 to 340 vehicles per hour two-way during peak hours. We have examined the effects of an additional 340 vehicles per hour on the operations of the following intersections:

- Pacific Highway/Albany Street;
- Pacific Highway/Christie Street;
- Christie Street/Atchison Street;
- Christie Street/Chandos Street;
- Willoughby Road/Chandos Street; and
- Willoughby Road/Atchison Street.

2.38 These intersections were analysed in the previous report prepared for the application. Traffic flows at these intersections, based on those presented in the previous report, plus the additional St Leonards development traffic, are shown in Figures 4 and 5 for the weekday morning and afternoon peak periods respectively. A summary is provided in Table 2.3.

Table 2.3: Existing morning peak hour traffic flows plus additional St Leonards development traffic					
Road	**Location**	**AM peak hour**		**PM peak hour**	
		Existing	Plus development	Existing	Plus development
Pacific Highway	West of Christie Street	4,095	+75	4,000	+80
	East of Christie Street	3,365	+15	3,260	+15
	North of Albany Street	3,440	+15	3,295	+15
	South of Albany Street	2,635	+45	2,460	+35
Christie Street	North of Chandos Street	510	+70	340	+60
	North of Atchison Street	1,080	+90	975	+95
	North of Pacific Highway	1,010	+90	955	+95
	South of Pacific Highway	200	-	95	-
Albany Street	East of Pacific Highway	1,035	+30	1,185	+20
Chandos Street	West of Christie Street	490	-	345	-
	East of Christie Street	910	+20	850	+30
	West of Willoughby Road	1,220	+85	1,305	+75
	East of Willoughby Road	1,280	+45	1,680	+40
Atchison Street	East of Christie Street	80	+50	40	+30
	West of Willoughby Road	215	+95	240	+85
	East of Willoughby Road	210	+50	185	+40
Willoughby Road	North of Chandos Street	1,155	+40	1,250	+35
	North of Atchison Street	840	-	880	-
	South of Atchison Street	745	+45	745	+45

2.39 Table 2.3 shows that traffic increases on Christie Street and Atchison Street would be some 30 to 95 vehicles per hour two-way at peak times. Increases on Pacific Highway, Albany Street, Chandos Street and Willoughby Road would be lower at some 15 to 80 vehicles per hour two-way.

2.40 The intersections in paragraph 2.37 have been analysed using SIDRA for the additional development traffic flows shown in Figures 4 and 5. The analysis found

that the intersections of Pacific Highway with Christie Street and Albany Street would operate with average delays of less than 35 seconds per vehicle during peak periods. This represents level of service C, a satisfactory level of service.

2.41 The intersections of Christie Street with Chandos Street and Atchison Street would operate with average delays of less than 20 seconds per vehicle during peak periods. This represents level of service B, a reasonable level of service.

2.42 The intersection of Willoughby Road with Chandos Street would operate with average delays of less than 35 seconds per vehicle during peak periods. This represents level of service C, a satisfactory level of service.

2.43 The intersection of Willoughby Road with Atchison Street would operate with average delays, for the highest delayed movement, of less than 25 seconds per vehicle during peak periods. This represents level of service B, a reasonable level of service.

2.44 Therefore, the road network will be able to cater for the additional traffic from the proposed development, as well as other development in St Leonards.

Having regard for the comments of Council's Traffic Engineer concerning the previous proposal, if approval is contemplated, the following design amendments and conditions are required:

- *Provision of loading docks within the site for 2 vehicles, namely a 10.7m heavy rigid vehicle and a 8.8m medium rigid vehicle, designed in accordance with Australian Standard AS 2890.2 (note: the single loading dock proposed in the basement is too small);*

2.45 Provision for service vehicles is discussed in paragraphs 2.10, 2.15 and 2.22. We note that the proposed provision for service vehicles satisfies DCP 2002 and that the RTA has suggested a condition limiting the size of vehicles to small rigid trucks.

- *Adequate queuing space (for three cars) at the driveway entry in front the security grill as per Australian Standard AS 2890.1;*

2.46 This matter is noted. The proposed amended design provides queuing for three cars off street, prior to reaching the security point.

- *An adequate number of bicycle lockers (42), bicycle rails (10) and motor cycle spaces (17) to be provided on site in accordance with Council's DCP;*

2.47 Parking for bicycles and motor cycles is discussed in paragraphs 2.17 to 2.23.

- *Design of the car park, ramps, car spaces, bicycle facilities and disabled spaces to be in accordance with Australian Standards AS 2890.1, AS 2890.3 and AS 2890.6 respectively;*

2.48 This matter is noted and could be included as a condition of consent, as discussed in paragraph 2.24.

- *A Construction Management Program for the development to be approved by the North Sydney Traffic Committee prior to issue of Construction Certificate (in view of the size and scale of the proposed 31-month construction phase).*

2.49 The requirement to prepare a construction traffic management plan could be included as a condition of consent.

Public Submissions

2.50 Matters raised in public submissions, and responses to them, are provided below.

- Submission 2

4. issues during tear down and construction period:

- Atchison Lane or Atchison St will be a major road block for neighbouring residents and road users, especially peak hours

2.51 A condition of consent could be included requiring the preparation of a construction traffic management plan for the development.

- Submissions 3, 29, 30

4. Several years ago the North Sydney Council narrowed the width of Atchison Street and made it one-way traffic in an Easterly direction between Christie and Mitchell Streets. In effect the very narrow Atchison Lane is now the only means of vehicular traffic entering and exiting from the residential and commercial buildings within garage entrances between Christie and Mitchell Streets. During peak hours there is significant vehicular congestion caused by the difficulty of traffic to enter or exit Atchison Lane from Christie Street, Mitchell Street and Oxley Street. The additional vehicular traffic created by the proposed development would exacerbate an already difficult situation into untenable traffic chaos.

5. Council and contractor waste collection trucks must use the very narrow Atchison Lane that makes it impossible for two cars to pass next to a waste collection vehicle. The proposed development of 38 hotel rooms and 228 units will increase the waste disposal requirements of the area by an order of magnitude. This in turn will increase the frequency of waste collection vehicles. It is understood that the proposed development will have off street loading bays high enough to accommodate waste removal vehicles,

but they will still have to enter and exit via Atchison Lane, thus further clogging an already overloaded thoroughfare.

6. *The proposed development includes a hotel complex that by its nature will increase the rate of vehicles dropping off and picking up passengers on Atchison Street and/or Atchison Lane. Regardless of the provision of an off-street drop off and pickup area, these vehicles must still re-enter Atchison Street or Atchison Lane, both of which are narrow and one-way in the case of Atchison Street.*

2.52 The effects of the additional traffic on the intersections of Atchison Lane with Christie Street and Mitchell Street are discussed in paragraphs 2.2 to 2.9.

2.53 With regards to waste collection vehicles, the proposed development will represent an improvement over the existing situation, with waste trucks being accommodated on site rather than on-street as at present. Vehicle swept paths are being prepared by URaP-TTW and provided under separate cover.

- Submission 4

If the proposal also includes a hotel and retail? How will guests staying at proposed hotel access the hotel, where will their taxi / driver stop to let guests into the hotel, again our concern is parking! Atchison Street is a very busy street already, how will everyday consumers access the retail stores, where will they park?

2.54 As previously discussed, the proposal includes a café and gymnasium. These will generally be used by people either in the building or already in the area. It is not anticipated that a large number of people will make a specific trip to use these facilities.

2.55 Most people using the hotel are expected to use public transport or be working in the area.

- Submission 5

The number of units of this 34 storey building will have a huge impact on local infrastructure and in particular transport:
Already there are traffic jams every morning and every evening along Atchison, Oxley and Albany Street. The addition of this high number of residents to the area will no doubt impact on the traffic.

2.56 The traffic effects of the proposed development, and other potential future developments, are discussed in paragraphs 2.2 to 2.9 and 2.30 to 2.44.

- Submission 6

Their TRANSPORT & ACCESSIBILITY REPORT states that there is 100 vehicular trips per peak hour from the existing 60 parking spaces in the existing buildings (166% turnover), which is incredulous. It then states that their new building would have only 75 vehicular trips per peak hour from 168 parking spaces (45% turnover). This comparison is fanciful in the extreme. While they have statistics on relevant intersections they avoid any analysis of how traffic is going to get in & out of Chandos Lane as this is blocked at Christie Street almost all day, let alone peak periods. As Atchison St is a one way street, we also have their traffic to contend with. If the mooted development around St Leonards station comes to fruition, then this problem will be exaserbated enormously.

2.57 Traffic generation of commercial office development (such as that currently on the site) is higher, per unit area, than the types of development proposed (residential and hotel).

2.58 The traffic effects of the proposed development are discussed in paragraphs 2.2 to 2.9 and 2.30 to 2.44. Observations made during a number of morning and afternoon peak periods did not indicate long delays or a significant number of vehicles turning from Atchison Lane onto Christie Street. Also, depending on the destination of traffic exiting the proposed development, alternative routes are available.

- Submission 7

It is totally unrealistic to construct a building containing commercial, residential and hotel space and not consider the potentially devastating effects on traffic and movement in the area. Atchison Street is a single lane one-way street emptying into Christie Street which provides a major thoroughfare from the Harbour Bridge via Chandos Street to the Pacific Highway. It is not unusual for traffic to be at a standstill in the morning and evening peak hours.

2.59 The traffic effects of the proposed development are discussed in paragraphs 2.2 to 2.9 and 2.30 to 2.44.

- Submissions 8, 24

B. Existing Traffic issues in the general area will be exacerbated by such a large development.

1. Atchison Lane (only 5M wide) is already seriously compromised with entrances and exits from car parks (Linea – 14 Atchison Street, Habitat, - 11 Chandos Street, 45-49 Chandos Street, Arden – 40 Atchison Street and 32-38 Atchison Street, (under development) – over 1,000 residents. Claims of compliance with the concept of "Activation of the Lanes" – as described in the report (as

being in the St Leonards' Strategy) – is deceptive in this context – the Lane will be further compromised.

2. *Residential using vehicles, to exit from Atchison Lane North into Christie Street currently find that almost impossible at busy times and both Mitchell Street to the South and particularly Oxley Street, which might be considered available to circumvent this problem, are almost at Traffic Gridlock at busy times or unsuitable for the purpose.*

3. *Residents wishing to go to the Freeway, logically try to go to Oxley Street where (to the West) there is roundabout access to Chandos Street and those wishing to go to the Pacific Highway also try to go to Oxley and East through to Albany Street – where there are Traffic lights onto Pacific Highway. However, both of these routes are at Traffic gridlock at busy times.*

4. *Waste collection, already very intrusive in Atchison Lane will be significantly increased. This includes Council refuse vehicles and private ones. There are very large vehicles which bring traffic to a stop on a regular basis as they block the Lane.*

5. *Activity of businesses abutting the Lane seems not to have been considered.*

6. *There is also the consideration of regular removalist vehicles – which can only service the buildings from the Atchison Lane. With 228 residential units proposed (together with the 170+ units already present – "Linea and Habitat), a regular pattern of moving (which exists in all high density high rise buildings) – will mean large moving vehicles causing restriction of the Lane on almost a daily basis. There is no proposal for a full size loading dock at ground level included in this development plan. A basement loading dock is proposed which of course will not be able to be accessed by almost all moving vehicles.*

(The North Sydney Council now requires major high rise developments to include a substantial ground floor loading dock in their plans).

7. *Albany Lane – which parallels Atchison Lane one block away to the South is proof of the difficulties caused by over development of this small part of the St Leonards area – signage has been changed to prohibit parking but the issue of servicing so many buildings and providing access to main traffic arteries is still difficult and relevant.*

C. *Traffic management plan for the building as a whole,*

1. *Hotel traffic management plan appears not to be clearly defined or outlined (ingress/egress);*
2. *The relevant part of Atchison Street is narrow and one way (from Christie to Mitchell Streets). Hotel traffic appears not to have been considered in this regard.*
3. *It is known that hotel traffic and residential traffic have distinctly different patters and it is evident that a narrow one way Street is unsuitable to this activity. The proposal includes 38 hotel rooms (and 228 residential units)*

2.60 The traffic effects of the proposed development are discussed in paragraphs 2.2 to 2.9 and 2.30 to 2.44. Provision for service vehicles is discussed in paragraph 2.45.

- Submission 9

4. *In ignoring quite sensible requirements set by Council in terms of basement and loading bay facilities the professional standards employed by the developer have to be seriously questioned.*

2.61 Provision for service vehicles is discussed in paragraph 2.45.

- Submission 10

It is our observation that the level of development (in spite of Council restrictions), has often been inappropriate to the environment because of the size of the streets and particularly the lanes behind the streets that service the high rise buildings. Our direct experience is of ***Albany Lane*** *(only one block away and slightly South of the proposed development at 6-16 Atchison Street) – a 5M wide lane – and the section to which our building has its vehicular entrance and exit is approximately 190M long. There are currently four (soon to be five) high rise buildings within similar entrance/exits into that section of the lane – about 470 units or about 1200 residents. Albany lane is frequently impassable due to*

- *Large refuse vehicles – stopping at regular intervals in the lane*
- *Delivery vehicles stopping at a particular businesses*
- *Removalist vehicles stopping for extended periods of time usually in the most inappropriate positions*
- *People who apparently are unable to read the parking signs*
- *And currently the building process for 9-11 Atchison Street*
- *Resident traffic*
- *Passing traffic which has tried to avoid traffic chaos in the vicinity*

Atchison Lane*, behind the proposed development at 6-16 Atchison Street is almost identical to Albany Lane and already has 2 high rise developments with their vehicular entrance and exits into the Lane (Linea and Habitat). The additional of 228 residential units in the proposed Part 3a development will result in a total of almost 400 units and impassability and issues similar to that in Albany Lane.*

Overdevelopment in the immediate vicinity causing Traffic chaos

There are a number of developments abutting Atchison Lane – East of Mitchell Street with high rise buildings at 45 – 49 Chandos Street, the Arden building at 40 Atchison Street and the coming development at 32-38 Atchison Street – about 260 units. Traffic issues are at a critical state with it being almost impossible for residents to exit West into Christie Street at busy times and therefore forced to go East to Mitchell or Oxley Streets to try to access

Chandos Street – for the freeway or Albany Street – for Pacific Highway. But all of these streets are at gridlock at busy times and additional traffic will therefore impose further problems on all the existing residents. The Traffic Report which says that "delays are expected at busy times" is seriously understated.

Parking in the environs

There is a completely false premise in our experience that people purchasing property in our neighbourhood – close to St Leonards station will not have cars. This is entirely fallacious and results in indiscriminate parking and use of parking facilities. The fact is that people who may indeed use public transport to go to work, still want to have a car available for evenings and weekends. In our experience, even a one bedroom apartment may have two cars involved. At the Abode, we have has to place parking bollards in our visitors parking area and on our wide pavement in Albany Lane to solve this problem.

Atchison Street itself

Atchison Street (in the specific area contemplated) is narrow – one way and one lane with meter parking on both sides. Hotel traffic we know is different and demands effective approach routes. Atchison Street does not qualify in this regard. Christie Street (as already described) is at gridlock for large parts of the day and Atchison Street is one way from Christie Street and one lane. A totally inappropriate approach route for even a small hotel.

The negative effects on the area generally

- *Existing traffic problems will be driven East to already gridlocked streets*

2.62 The traffic effects of the proposed development are discussed in paragraphs 2.2 to 2.9 and 2.30 to 2.44. Provision for service vehicles is discussed in paragraph 2.45. Parking provision is discussed in paragraphs 2.17 to 2.23.

- Submission 11

I do not support this project for the following reasons,

2. The traffic will only add to the already congested area of St.Leonards. Perhaps a smaller version of the building would be acceptable with less traffic and not so high.

2.63 The traffic effects of the proposed development are discussed in paragraphs 2.2 to 2.9 and 2.30 to 2.44.

- Submission 12

As it will be a hotel complex, they will be increase traffic as natureof a hotel, in the immediate and surrounding streets. Currently, there is already a problem with traffic especially during peak hours. It will make the traffic problem worse and could make it an all day traffic congestion area.

2.64 The traffic effects of the proposed development are discussed in paragraphs 2.2 to 2.9 and 2.30 to 2.44.

- Submission 13

1. Currently, St Leonards is already suffering from heavy traffic and occasional congestion during the peak hours of 7:30am-9:00am and 5:00pm- 7:00pm, as well as frequent Saturday traffic jams. In addition, St Leonards and Wollstonecraft station are also operating at over-capacity during those time. There are great concerns that with the new major development, this would lead to a worsening of the current traffic problems suffered in the area.

2.65 The traffic effects of the proposed development are discussed in paragraphs 2.2 to 2.9 and 2.30 to 2.44.

o Submission 15

The building will add considerable extra traffic flow in the already congested Atchison Lane access street. Why not have access through Atchison St?

2.66 The traffic effects of the proposed development are discussed in paragraphs 2.2 to 2.9 and 2.30 to 2.44. Access is proposed from Atchison Lane for urban design reasons and for improved accessibility.

o Submission 16

- *A building of the proposed size would generate excessive traffic on surrounding streets, in particular Christie st and Atchison Lane which are already too busy during peak hours.*
- *As I mentioned before the congestion on Atchison Lane and Christie St are very bad during peak hour and would be made worse by years of trucks and machines in and out of the construction site.*

2.67 The traffic effects of the proposed development are discussed in paragraphs 2.2 to 2.9 and 2.30 to 2.44. As discussed in paragraph 2.27, the requirement to prepare a construction traffic management plan could be included as a condition of consent.

o Submission 17

Firstly, traffic in Atchison Lane will increase, especially since the proposal is for a building that contains several floors for hotel use. It will mean that there will be a continuous flow of taxis in the lane, as well as hotel stayers coming in and out.

2.68 The traffic effects of the proposed development are discussed in paragraphs 2.2 to 2.9 and 2.30 to 2.44.

- Submission 18

(b) little though has been given to the possible effect of funnelling people through the "site link" into Atchison Lane. Atchison Lane is a very narrow lane way, which is often congested by vehicles, including trucks. It is not only used frequently by waste collection trucks, other trucks, such as removalist trucks, often block the laneway and significantly reduce visibility. It is also used by numerous vehicles trying to bypass the traffic on Chandos Street. I think it would be a dangerous for a high volume of pedestrians to be using this laneway either in the day or at night.

3. Atchison Street and Atchison Lane, and the surrounding streets, including Christie Street all have significant traffic flow at the present time, due to their proximity to the Pacific Highway. A large complex, including a hotel and residential housing would necessitate an increased volume of traffic in an already congested area. The part of Atchison Street which would be affected by the proposed development is a narrow one-way street. I am concerned for the safety of pedestrians in Atchison Street of the project proceeds as they would be required to complete with numerous vehicles entering the street to drop off and collect passengers at the hotel. Also, the dangerous practise of double parking is already a problem in the street, and is likely to be significantly heightened.

2.69 In relation to the through site pedestrian link, it is not envisaged that the proposed development will generate a significant number of additional pedestrians in Atchison Lane. Those that currently use Atchison Lane will have an alternative path of travel as a result of the pedestrian link.

2.70 The traffic effects of the proposed development are discussed in paragraphs 2.2 to 2.9 and 2.30 to 2.44. Parking is discussed in paragraphs 2.17 to 2.23.

- Submissions 19, 20, 21, 22

4. *North Sydney Council narrowed the width of Atchison Street and made it one-way traffic in an Easterly direction between Christie and Mitchell Streets. In effect the very narrow Atchison Lane is now the only means of vehicular traffic entering and exiting from the residential and commercial buildings with garage entrances between Christie and Mitchell streets. There is already significant vehicular congestion caused by the difficulty of traffic to enter or exit Atchison Lane from Christie Street, Mitchell Street and Oxley Street. This is especially so during peak hours, and during non-peak hours, there are other causes of congestion eg. garbage trucks and trucks for relocation blocking the passage way for cars. As such the additional vehicular traffic created by the proposed development will exacerbate the already difficult situation into untenable traffic chaos.*
5. *As mentioned above, any vehicle that is parking on Atchison Lane for whatever reason eg. waste collection, removalists, vehicles with drivers waiting for other passengers etc. will make it difficult for two cars to pass side by side and where the blocking vehicle is larger, it is impossible for cars to pass next it eg. a waste collection vehicle. The proposed development of 38 hotel rooms and 228 units will increase waste disposal requirements of the area by an order of magnitude. This in turn will increase the frequency of waste collection vehicles, which will cause chaos and be a nightmare for residents in the area such as myself. It is understood that the proposed development will have off street loading bays high enough to accommodate waste removal vehicles, however, they will still need to enter and exit via the very narrow Atchison Lane, thus further clogging an already overloaded thoroughfare.*
6. *The proposed development includes a hotel complex that by its nature will increase the rate of vehicles dropping off and picking up passengers on Atchison Street and/or Atchison Lane. Regardless of the provision of an off-street drop off and pick-up area,*

these vehicles must still re-enter Atchison Street or Atchison Lane, both of which are narrow and one-way in the case of Atchison Street.

2.71 These matters are addressed in paragraphs 2.45 and 2.46.

- Submission 23

With propose 168 car parking new spaces, there will be a large increase in the number of vehicles associated with that. As there are already lots of vehicles congestion around Forum Tower on Chandos Street/Pacific Highway and Christie Streets, and the situation is far worse during peak morning and evening work travel periods. Additional volume of cars coming and out would, in my opinion, make the area far more congested for residents entering and exiting Forum Tower car park. The congestion will also impact travelers along the Pacific Highway for south and north bound traffic.

2.72 The traffic effects of the proposed development are discussed in paragraphs 2.2 to 2.9 and 2.30 to 2.44.

- Submission 25

4. The resulting additional traffic flowing into and from the building will further add to existing traffic problems. The surrounding area is congested for significant periods morning, evenings and on weekends.

2.73 The traffic effects of the proposed development are discussed in paragraphs 2.2 to 2.9 and 2.30 to 2.44.

- Submission 26

4. Access to public transport.

The DOP has set increased density and job targets for St. Leonards as a hub for rail and bus services. We submit that if approved, the cumulative effects of this project as a precedent would put unreasonable strain on these services. Density is being increased along the North Shore and Chatswood to Epping Lines at several points. Any train that arrives at St. Leonards in peak hour is likely to be crowded. The timetable does not indicate how many trains fail to stop in order to make up time, nor how many passengers are left waiting for the next train because they are unable to board. Various government reports have signalled that in order to run more trains to meet increased density, there needs to be a second City to Chatswood Line but that appears to be unlikely to proceed.

Our residents are also aware that peak hour bus services are also frequently unable to pick up passengers or only allow a few people to get on. The cumulative effect of this project as a precedent would put peak-hour bus services under even greater strain.

5. Traffic Impact.

If approved, the cumulative effect of this precedent for large mixed use development well in excess of planning controls would have a significant impact on local roads. (PDS07 at p. 13). This area is already heavily burdened by through traffic in residential streets. Drivers choose local roads rather than the Pacific Highway which has traffic lights at almost every intersection. There is heavy traffic on Christie, Albany and Chandos Streets throughout the day and Oxley Street in peak. There is a flow-on effect to Willoughby Road and Alexander Street. Ernest and Falcon Streets are at near capacity in peak. Both are frequently at a standstill back to the Warringah Freeway and beyond, increasing the burden on residential streets like Burlington and Holtermann Streets.

6. Street parking.

Similarly, increased density and jobs increases the burden on street parking which is in short supply in St. Leonards. It is likely that residents in the Naremburn conservation area are increasingly affected, detrimentally.

2.74 In relation to public transport, The NSW Transport Plan and Metropolitan Strategy require developments to utilise public transport and not rely on private cars. It is anticipated that CityRail and Sydney Buses will make the necessary increases to the services operating to St Leonards in accordance with demands.

2.75 The traffic effects of the proposed development are discussed in paragraphs 2.2 to 2.9 and 2.30 to 2.44. Parking provision is discussed in paragraphs 2.17 to 2.23.

- Submission 27

2. The roads surrounding the proposed development are narrow and are already at or close to capacity during peak times. The Transport and Accessibility Report, which suggests that the new development would result in fewer vehicle movements than the current situation, is not realistic as it fails to identify that the mixed residential and commercial use at the present time in the area means that traffic congestion is lessened, as the traffic is not using the roads at the same time. Commercial traffic will generally operate between 9am to 5pm while residential traffic would generally be outside of those hours. By replacing a commercial building by a largely residential building, there would be significant traffic created as residents leave and return to the proposed site at similar times to existing neighbouring residential tenants. Significant traffic congestion already exists in Atchison Lane during peak hours and a development of the magnitude proposed will only worsen the situation.

3. The Transport and Accessibility Report does not adequately address the insufficient on-street parking available in Atchison Street and vicinity. As identified in the traffic report, there is time-limited parking around the proposed development which helps to

resolve parking constraints. However, the traffic report fails to identify that the time-limited parking does not apply on Saturday afternoons and all day Sunday. At the present time, the availability of parking during non time-limited periods is very limited. With the addition of 228 new residential apartments, parking on weekends would be chaotic and most likely lead to vehicles being parked illegally, causing danger to pedestrians and other road users, as well as inconveniencing local residents, including residents of the proposed development.

2.76 The traffic effects of the proposed development are discussed in paragraphs 2.2 to 2.9 and 2.30 to 2.44. Parking provision is discussed in paragraphs 2.17 to 2.23.

- Submission 28

2. The rear lane, Atchison Lane, is already quite busy with vehicles going in both directions into "Linea", "Habitat" and other buildings. Such a narrow lane cannot possibly carry more traffic. With the new building at 6-16 Atchison St erected, it would undoubtedly create such unbearable congestion at the rear lane. That will result in great annoyance and inconvenience for all parties concerned.

3. All traffic at Atchison Lane will empty out to Christie St at one end. To be honest, Christie St (being the link between Chandos St and Pacific Highway) is already busy 24/7. It cannot possibly have more congestion with more vehicles pouring in and out of Atchison Lane.

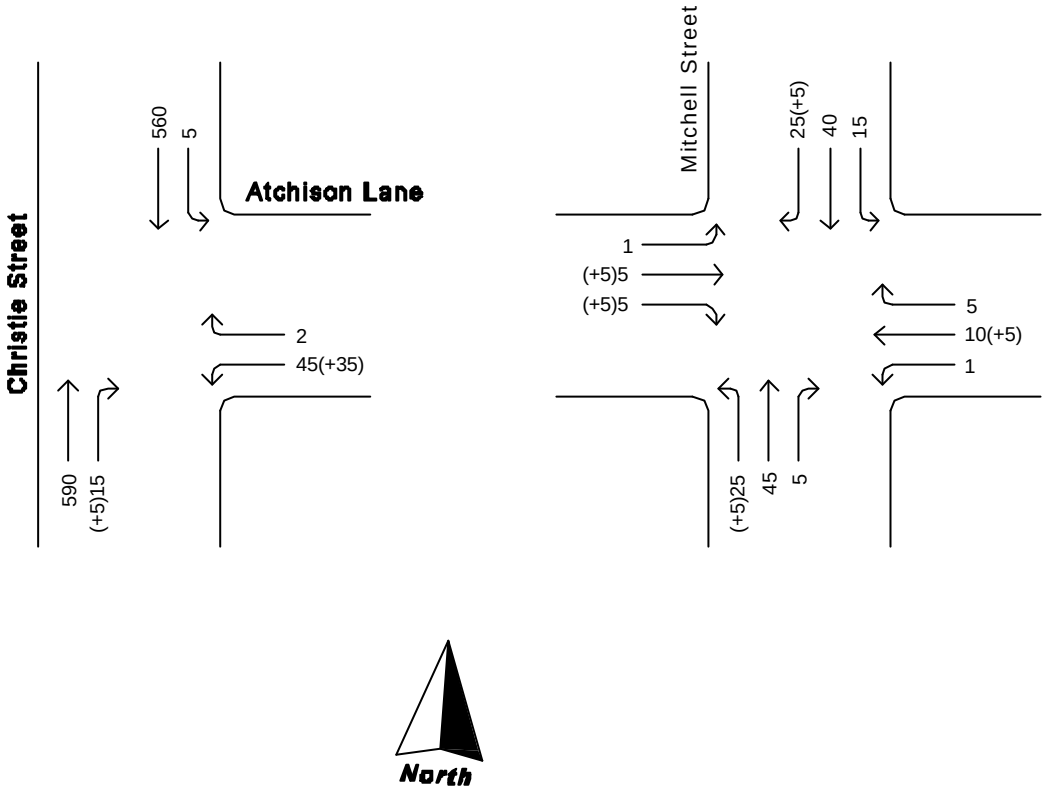
2.77 The traffic effects of the proposed development are discussed in paragraphs 2.2 to 2.9 and 2.30 to 2.44.

Location Plan

Colston Budd Hunt & Kafes Pty Ltd

DRAWN BY CBHK Pty Ltd_hs Ref: 8094 03 February 2011

Figure 1



LEGEND

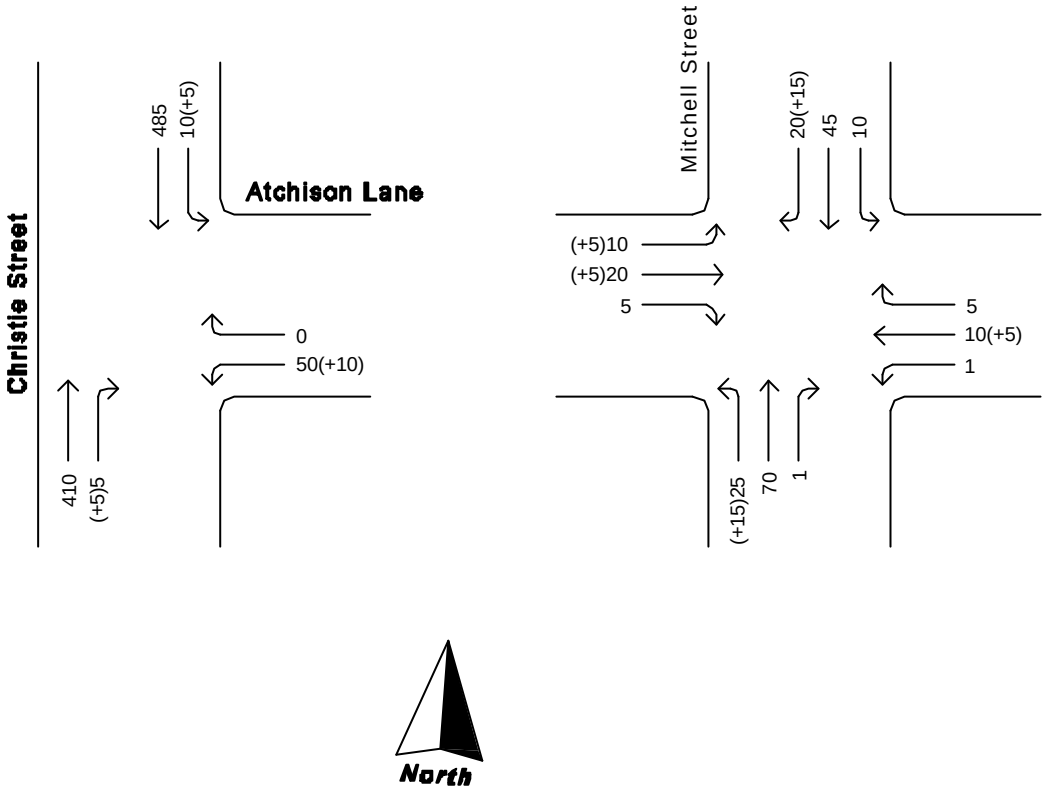
100 - Existing Peak Hour Traffic Flows
(+10) - Additional Development Traffic

Existing morning peak hour traffic flows plus development traffic

Colston Budd Hunt & Kafes Pty Ltd

DRAWN BY CBHK Pty Ltd_hs Ref: 8094 03 February 2011

Figure 2



LEGEND

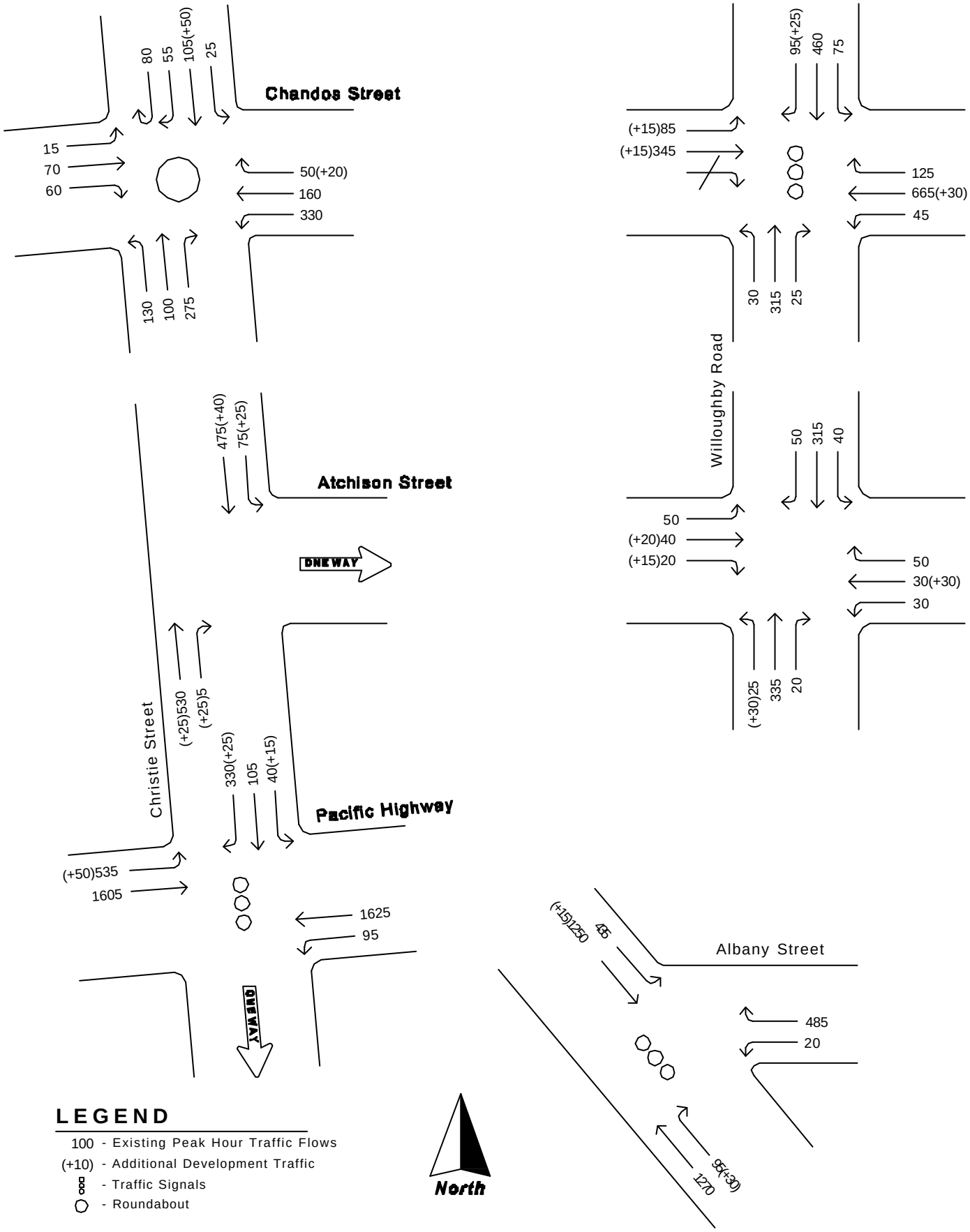
100 - Existing Peak Hour Traffic Flows
(+10) - Additional Development Traffic

Existing afternoon peak hour traffic flows plus development traffic

Colston Budd Hunt & Kafes Pty Ltd

DRAWN BY CBHK Pty Ltd_hs Ref: 8094 03 February 2011

Figure 3

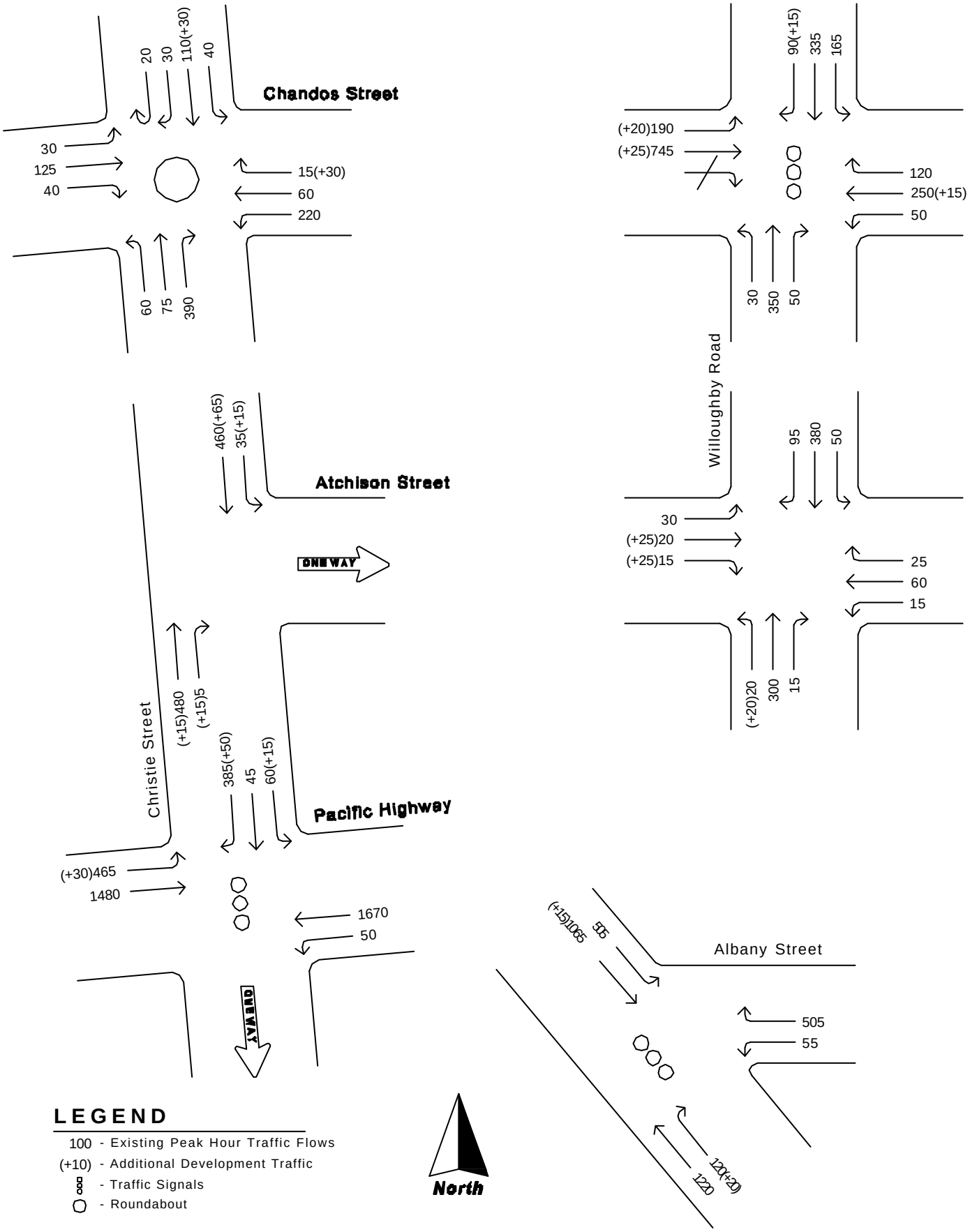


Existing morning peak hour traffic flows plus St Leonards development traffic

Colston Budd Hunt & Kafes Pty Ltd

DRAWN BY CBHK Pty Ltd_hs Ref: 8094 14 April 2011

Figure 4



Existing afternoon peak hour traffic flows plus St Leonards development traffic

Colston Budd Hunt & Kafes Pty Ltd

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Figure 5

APPENDIX A

SIDRA OUTPUT SUMMARIES

MOVEMENT SUMMARY

Site: Ex AM

Christie Street & Atchison Lane
Existing morning peak hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Christie Street south											
2	T	590	1.0	0.325	5.1	LOS A	5.5	38.8	0.78	0.00	34.9
3	R	15	1.0	0.326	10.0	LOS A	5.5	38.8	0.78	1.02	34.4
Approach		605	1.0	0.325	5.2	LOS A	5.5	38.8	0.78	0.03	34.9
East: Atchison Lane											
4	L	45	1.0	0.085	9.0	LOS A	0.4	2.5	0.55	0.76	33.9
6	R	2	1.0	0.083	9.4	LOS A	0.4	2.5	0.55	0.83	33.8
Approach		47	1.0	0.085	9.0	LOS A	0.4	2.5	0.55	0.76	33.9
North: Christie Street north											
7	L	5	1.0	0.294	4.5	LOS A	0.0	0.0	0.00	0.70	36.7
8	T	560	1.0	0.292	0.0	LOS A	0.0	0.0	0.00	0.00	40.0
Approach		565	1.0	0.292	0.0	LOS A	0.0	0.0	0.00	0.01	40.0
All Vehicles		1217	1.0	0.326	3.0	NA	5.5	38.8	0.41	0.04	37.0

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.

Level of Service (Worst Movement): LOS A. LOS Method for individual vehicle movements: Delay (RTA NSW).

Approach LOS values are based on the worst delay for any vehicle movement.

SIDRA INTERSECTION

MOVEMENT SUMMARY

Site: Ex PM

Christie Street & Atchison Lane
Existing afternoon peak hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Christie Street south											
2	T	410	1.0	0.218	3.3	LOS A	2.7	19.3	0.66	0.00	35.7
3	R	5	1.0	0.217	8.2	LOS A	2.7	19.3	0.66	0.90	35.3
Approach		415	1.0	0.218	3.4	LOS A	2.7	19.3	0.66	0.01	35.7
East: Atchison Lane											
4	L	50	1.0	0.078	7.8	LOS A	0.3	2.4	0.51	0.71	34.6
6	R	1	1.0	0.077	8.3	LOS A	0.3	2.4	0.51	0.81	34.4
Approach		51	1.0	0.078	7.8	LOS A	0.3	2.4	0.51	0.71	34.6
North: Christie Street north											
7	L	10	1.0	0.256	4.5	LOS A	0.0	0.0	0.00	0.70	36.7
8	T	485	1.0	0.256	0.0	LOS A	0.0	0.0	0.00	0.00	40.0
Approach		495	1.0	0.256	0.1	LOS A	0.0	0.0	0.00	0.01	39.9
All Vehicles		961	1.0	0.256	1.9	NA	2.7	19.3	0.31	0.05	37.7

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.

Level of Service (Worst Movement): LOS A. LOS Method for individual vehicle movements: Delay (RTA NSW).

Approach LOS values are based on the worst delay for any vehicle movement.

SIDRA INTERSECTION

MOVEMENT SUMMARY

Site: Ex AM + dev

Christie Street & Atchison Lane
Existing morning peak hour + development
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Christie Street south											
2	T	590	1.0	0.331	5.2	LOS A	5.7	40.0	0.78	0.00	34.9
3	R	20	1.0	0.333	10.1	LOS A	5.7	40.0	0.78	1.03	34.3
Approach		610	1.0	0.331	5.3	LOS A	5.7	40.0	0.78	0.03	34.9
East: Atchison Lane											
4	L	80	1.0	0.144	9.0	LOS A	0.6	4.4	0.56	0.79	33.9
6	R	2	1.0	0.143	9.4	LOS A	0.6	4.4	0.56	0.83	33.8
Approach		82	1.0	0.144	9.0	LOS A	0.6	4.4	0.56	0.79	33.9
North: Christie Street north											
7	L	5	1.0	0.294	4.5	LOS A	0.0	0.0	0.00	0.70	36.7
8	T	560	1.0	0.292	0.0	LOS A	0.0	0.0	0.00	0.00	40.0
Approach		565	1.0	0.292	0.0	LOS A	0.0	0.0	0.00	0.01	40.0
All Vehicles		1257	1.0	0.333	3.2	NA	5.7	40.0	0.42	0.07	36.9

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.

Level of Service (Worst Movement): LOS A. LOS Method for individual vehicle movements: Delay (RTA NSW).

Approach LOS values are based on the worst delay for any vehicle movement.

SIDRA INTERSECTION

MOVEMENT SUMMARY

Site: Ex PM + dev

Christie Street & Atchison Lane
Existing afternoon peak hour + development
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Christie Street south											
2	T	410	1.0	0.224	3.4	LOS A	2.8	19.8	0.66	0.00	35.6
3	R	10	1.0	0.222	8.3	LOS A	2.8	19.8	0.66	0.90	35.2
Approach		420	1.0	0.224	3.5	LOS A	2.8	19.8	0.66	0.02	35.6
East: Atchison Lane											
4	L	60	1.0	0.094	7.9	LOS A	0.4	2.9	0.51	0.72	34.5
6	R	1	1.0	0.091	8.3	LOS A	0.4	2.9	0.51	0.81	34.4
Approach		61	1.0	0.094	7.9	LOS A	0.4	2.9	0.51	0.72	34.5
North: Christie Street north											
7	L	15	1.0	0.259	4.5	LOS A	0.0	0.0	0.00	0.69	36.7
8	T	485	1.0	0.259	0.0	LOS A	0.0	0.0	0.00	0.00	40.0
Approach		500	1.0	0.258	0.1	LOS A	0.0	0.0	0.00	0.02	39.9
All Vehicles		981	1.0	0.259	2.1	NA	2.8	19.8	0.31	0.06	37.6

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS A. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Site: Ex AM

Mitchell Street & Atchison Lane
Existing morning peak hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mitchell Street south											
1	L	25	1.0	0.040	4.7	LOS A	0.3	1.9	0.18	0.50	36.3
2	T	45	1.0	0.040	0.2	LOS A	0.3	1.9	0.18	0.00	38.6
3	R	5	1.0	0.040	5.1	LOS A	0.3	1.9	0.18	0.65	36.2
Approach		75	1.0	0.040	2.0	LOS A	0.3	1.9	0.18	0.21	37.6
East: Atchsion Lane east											
4	L	1	1.0	0.016	5.3	LOS A	0.1	0.6	0.27	0.48	36.0
5	T	10	1.0	0.016	4.0	LOS A	0.1	0.6	0.27	0.40	36.6
6	R	5	1.0	0.016	5.8	LOS A	0.1	0.6	0.27	0.60	35.9
Approach		16	1.0	0.016	4.6	LOS A	0.1	0.6	0.27	0.46	36.3
North: Mitchell Street north											
7	L	15	1.0	0.047	4.8	LOS A	0.3	2.1	0.19	0.47	36.3
8	T	40	1.0	0.047	0.3	LOS A	0.3	2.1	0.19	0.00	38.5
9	R	25	1.0	0.047	5.2	LOS A	0.3	2.1	0.19	0.63	36.1
Approach		80	1.0	0.047	2.6	LOS A	0.3	2.1	0.19	0.29	37.3
West: Atchison Lane west											
10	L	1	1.0	0.011	5.3	LOS A	0.1	0.4	0.27	0.47	36.0
11	T	5	1.0	0.011	4.0	LOS A	0.1	0.4	0.27	0.38	36.5
12	R	5	1.0	0.011	5.7	LOS A	0.1	0.4	0.27	0.58	35.9
Approach		11	1.0	0.011	4.9	LOS A	0.1	0.4	0.27	0.48	36.2
All Vehicles		182	1.0	0.047	2.7	NA	0.3	2.1	0.20	0.28	37.3

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS A. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Site: Ex PM

Mitchell Street & Atchison Lane
Existing afternoon peak hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mitchell Street south											
1	L	25	1.0	0.053	4.7	LOS A	0.4	2.6	0.18	0.52	36.4
2	T	70	1.0	0.053	0.2	LOS A	0.4	2.6	0.18	0.00	38.6
3	R	5	1.0	0.053	5.1	LOS A	0.4	2.6	0.18	0.68	36.2
Approach		100	1.0	0.053	1.6	LOS A	0.4	2.6	0.18	0.16	37.9
East: Atchsion Lane east											
4	L	5	1.0	0.020	5.4	LOS A	0.1	0.8	0.23	0.49	36.1
5	T	10	1.0	0.020	4.1	LOS A	0.1	0.8	0.23	0.40	36.7
6	R	5	1.0	0.020	5.8	LOS A	0.1	0.8	0.23	0.61	35.9
Approach		20	1.0	0.020	4.8	LOS A	0.1	0.8	0.23	0.48	36.4
North: Mitchell Street north											
7	L	10	1.0	0.044	4.8	LOS A	0.3	2.0	0.22	0.47	36.3
8	T	45	1.0	0.044	0.3	LOS A	0.3	2.0	0.22	0.00	38.3
9	R	20	1.0	0.044	5.3	LOS A	0.3	2.0	0.22	0.65	36.1
Approach		75	1.0	0.044	2.3	LOS A	0.3	2.0	0.22	0.24	37.4
West: Atchison Lane west											
10	L	10	1.0	0.035	5.4	LOS A	0.2	1.3	0.27	0.52	36.0
11	T	20	1.0	0.035	4.1	LOS A	0.2	1.3	0.27	0.41	36.6
12	R	5	1.0	0.035	5.8	LOS A	0.2	1.3	0.27	0.62	35.9
Approach		35	1.0	0.035	4.7	LOS A	0.2	1.3	0.27	0.47	36.3
All Vehicles		230	1.0	0.053	2.6	NA	0.4	2.6	0.21	0.26	37.4

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS A. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Site: Ex AM + dev

Mitchell Street & Atchison Lane
Existing morning peak hour + development
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mitchell Street south											
1	L	30	1.0	0.043	4.7	LOS A	0.3	2.1	0.19	0.49	36.3
2	T	45	1.0	0.043	0.2	LOS A	0.3	2.1	0.19	0.00	38.5
3	R	5	1.0	0.043	5.1	LOS A	0.3	2.1	0.19	0.64	36.1
Approach		80	1.0	0.043	2.2	LOS A	0.3	2.1	0.19	0.22	37.5
East: Atchsion Lane east											
4	L	1	1.0	0.021	5.4	LOS A	0.1	0.8	0.29	0.49	36.0
5	T	15	1.0	0.021	4.1	LOS A	0.1	0.8	0.29	0.41	36.5
6	R	5	1.0	0.021	5.9	LOS A	0.1	0.8	0.29	0.61	35.9
Approach		21	1.0	0.021	4.6	LOS A	0.1	0.8	0.29	0.46	36.4
North: Mitchell Street north											
7	L	15	1.0	0.051	4.8	LOS A	0.3	2.3	0.19	0.46	36.3
8	T	40	1.0	0.051	0.3	LOS A	0.3	2.3	0.19	0.00	38.4
9	R	30	1.0	0.051	5.2	LOS A	0.3	2.3	0.19	0.62	36.1
Approach		85	1.0	0.051	2.8	LOS A	0.3	2.3	0.19	0.30	37.2
West: Atchison Lane west											
10	L	1	1.0	0.021	5.4	LOS A	0.1	0.8	0.30	0.48	35.9
11	T	10	1.0	0.021	4.1	LOS A	0.1	0.8	0.30	0.40	36.5
12	R	10	1.0	0.021	5.9	LOS A	0.1	0.8	0.30	0.59	35.8
Approach		21	1.0	0.021	5.0	LOS A	0.1	0.8	0.30	0.49	36.1
All Vehicles		207	1.0	0.051	3.0	NA	0.3	2.3	0.21	0.31	37.1

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS A. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Site: Ex PM + dev

Mitchell Street & Atchison Lane
Existing afternoon peak hour + development
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mitchell Street south											
1	L	40	1.0	0.061	4.7	LOS A	0.4	3.0	0.19	0.50	36.3
2	T	70	1.0	0.061	0.2	LOS A	0.4	3.0	0.19	0.00	38.5
3	R	5	1.0	0.062	5.1	LOS A	0.4	3.0	0.19	0.66	36.1
Approach		115	1.0	0.061	2.0	LOS A	0.4	3.0	0.19	0.20	37.6
East: Atchsion Lane east											
4	L	5	1.0	0.026	5.6	LOS A	0.1	1.0	0.26	0.50	36.0
5	T	15	1.0	0.026	4.3	LOS A	0.1	1.0	0.26	0.42	36.6
6	R	5	1.0	0.026	6.0	LOS A	0.1	1.0	0.26	0.63	35.8
Approach		25	1.0	0.026	4.9	LOS A	0.1	1.0	0.26	0.48	36.3
North: Mitchell Street north											
7	L	10	1.0	0.056	4.9	LOS A	0.4	2.5	0.23	0.44	36.2
8	T	45	1.0	0.056	0.4	LOS A	0.4	2.5	0.23	0.00	38.1
9	R	35	1.0	0.056	5.4	LOS A	0.4	2.5	0.23	0.63	36.0
Approach		90	1.0	0.056	2.8	LOS A	0.4	2.5	0.23	0.29	37.1
West: Atchison Lane west											
10	L	15	1.0	0.046	5.5	LOS A	0.2	1.7	0.28	0.52	36.0
11	T	25	1.0	0.046	4.2	LOS A	0.2	1.7	0.28	0.43	36.6
12	R	5	1.0	0.045	5.9	LOS A	0.2	1.7	0.28	0.64	35.9
Approach		45	1.0	0.046	4.8	LOS A	0.2	1.7	0.28	0.48	36.3
All Vehicles		275	1.0	0.062	3.0	NA	0.4	3.0	0.22	0.30	37.1

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS A. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Site: Pacific Highway & Albany St
- ex AM + dev

Pacific Highway & Albany Street
Existing AM peak hour + development
Signals - Fixed Time Cycle Time = 111 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Pacific Highway south											
2	T	1270	2.0	0.555	14.4	LOS A	21.4	152.0	0.65	0.59	41.1
3	R	125	2.0	0.631	61.0	LOS E	8.5	60.6	1.00	0.81	21.6
Approach		1395	2.0	0.631	18.6	LOS B	21.4	152.0	0.68	0.61	38.1
East: Albany Street											
4	L	20	2.0	0.670	40.3	LOS C	7.7	55.1	0.80	0.81	26.3
6	R	485	2.0	0.665	43.1	LOS D	18.4	130.9	0.90	0.84	25.5
Approach		505	2.0	0.665	43.0	LOS D	18.4	130.9	0.90	0.84	25.5
North: Pacific Highway north											
7	L	435	2.0	0.665	30.6	LOS C	24.8	176.7	0.82	0.87	32.0
8	T	1265	2.0	0.665	26.4	LOS B	24.8	176.7	0.85	0.76	33.0
Approach		1700	2.0	0.665	27.5	LOS B	24.8	176.7	0.84	0.79	32.8
All Vehicles		3600	2.0	0.665	26.2	LOS B	24.8	176.7	0.79	0.73	33.2

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS E. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	39.8	LOS D	0.1	0.1	0.85	0.85
P3	Across E approach	53	24.0	LOS C	0.1	0.1	0.66	0.66
All Pedestrians		106	31.9				0.75	0.75

Level of Service (Aver. Int. Delay): LOS D. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS D. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: Pacific Highway & Albany St - ex PM + dev

Pacific Highway & Albany Street
Existing PM peak hour + development
Signals - Fixed Time Cycle Time = 110 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Pacific Highway south											
2	T	1220	2.0	0.553	15.6	LOS B	21.1	150.0	0.67	0.61	40.1
3	R	140	2.0	0.701	61.8	LOS E	9.4	67.2	1.00	0.84	21.4
Approach		1360	2.0	0.701	20.4	LOS B	21.1	150.0	0.71	0.63	37.0
East: Albany Street											
4	L	55	2.0	0.692	38.7	LOS C	8.2	58.2	0.77	0.82	26.9
6	R	505	2.0	0.693	41.8	LOS C	20.0	142.4	0.90	0.85	25.9
Approach		560	2.0	0.693	41.5	LOS C	20.0	142.4	0.89	0.84	26.0
North: Pacific Highway north											
7	L	505	2.0	0.353	11.3	LOS A	9.7	69.0	0.33	0.73	44.6
8	T	1080	2.0	0.686	28.6	LOS C	24.4	173.4	0.88	0.78	32.0
Approach		1585	2.0	0.686	23.1	LOS B	24.4	173.4	0.70	0.77	35.1
All Vehicles		3505	2.0	0.701	25.0	LOS B	24.4	173.4	0.74	0.73	33.8

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS E. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	37.6	LOS D	0.1	0.1	0.83	0.83
P3	Across E approach	53	25.6	LOS C	0.1	0.1	0.68	0.68
All Pedestrians		106	31.6				0.75	0.75

Level of Service (Aver. Int. Delay): LOS D. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS D. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: Pacific Highway & Christie St - ex AM + dev

Pacific Highway & Christie Street
Existing AM peak hour + development
Signals - Fixed Time Cycle Time = 123 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Pacific Highway east											
4	L	95	2.0	0.454	18.3	LOS B	17.5	124.5	0.53	0.97	40.4
5	T	1625	2.0	0.454	10.8	LOS A	17.6	125.4	0.53	0.47	44.4
Approach		1720	2.0	0.454	11.2	LOS A	17.6	125.4	0.53	0.50	44.2
North: Christie Street north											
7	L	55	2.0	0.571	51.5	LOS D	15.2	108.1	0.93	0.84	23.5
8	T	105	2.0	0.571	44.2	LOS D	15.2	108.1	0.93	0.79	22.9
9	R	355	2.0	0.571	51.4	LOS D	15.2	108.1	0.93	0.83	23.3
Approach		515	2.0	0.571	50.0	LOS D	15.2	108.1	0.93	0.82	23.2
West: Pacific Highway west											
10	L	585	2.0	0.568	13.9	LOS A	18.6	132.4	0.52	0.82	42.7
11	T	1605	2.0	0.568	11.5	LOS A	23.8	169.4	0.58	0.53	43.5
Approach		2190	2.0	0.568	12.1	LOS A	23.8	169.4	0.57	0.61	43.3
All Vehicles		4425	2.0	0.571	16.2	LOS B	23.8	169.4	0.59	0.59	39.6

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS D. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	7.9	LOS A	0.1	0.1	0.36	0.36
P3	Across E approach	53	48.3	LOS E	0.2	0.2	0.89	0.89
P5	Across N approach	53	11.0	LOS B	0.1	0.1	0.42	0.42
All Pedestrians		159	22.4				0.56	0.56

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS E. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: Pacific Highway & Christie St - ex PM + dev

Pacific Highway & Christie Street
Existing PM peak hour + development
Signals - Fixed Time Cycle Time = 123 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Pacific Highway east											
4	L	50	2.0	0.475	20.5	LOS B	19.0	135.1	0.58	0.99	39.1
5	T	1670	2.0	0.476	12.9	LOS A	19.0	135.6	0.58	0.52	42.4
Approach		1720	2.0	0.476	13.2	LOS A	19.0	135.6	0.58	0.53	42.3
North: Christie Street north											
7	L	75	2.0	0.546	48.2	LOS D	15.6	111.3	0.91	0.83	24.2
8	T	45	2.0	0.546	40.9	LOS C	15.6	111.3	0.91	0.77	23.6
9	R	435	2.0	0.546	48.1	LOS D	15.6	111.3	0.91	0.83	24.1
Approach		555	2.0	0.546	47.5	LOS D	15.6	111.3	0.91	0.83	24.1
West: Pacific Highway west											
10	L	495	2.0	0.541	15.6	LOS B	18.3	130.1	0.56	0.83	41.3
11	T	1480	2.0	0.541	13.1	LOS A	22.5	159.9	0.60	0.55	42.1
Approach		1975	2.0	0.541	13.7	LOS A	22.5	159.9	0.59	0.62	41.9
All Vehicles		4250	2.0	0.546	17.9	LOS B	22.5	159.9	0.63	0.61	38.4

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS D. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	9.4	LOS A	0.1	0.1	0.39	0.39
P3	Across E approach	53	44.8	LOS E	0.2	0.2	0.85	0.85
P5	Across N approach	53	12.7	LOS B	0.1	0.1	0.46	0.46
All Pedestrians		159	22.3				0.57	0.57

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS E. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: Ex AM + dev

Willoughby Road & Atchison Street
Existing morning peak hour + development
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Willoughby Road south											
1	L	55	2.0	0.224	8.5	LOS A	2.3	16.7	0.58	0.35	42.7
2	T	335	2.0	0.224	2.1	LOS A	2.3	16.7	0.58	0.00	43.2
3	R	20	2.0	0.225	8.9	LOS A	2.3	16.7	0.58	0.87	42.7
Approach		410	2.0	0.224	3.3	LOS A	2.3	16.7	0.58	0.09	43.1
East: Atchison Street east											
4	L	30	2.0	0.395	19.6	LOS B	2.4	17.2	0.74	0.95	34.1
5	T	60	2.0	0.397	18.3	LOS B	2.4	17.2	0.74	0.95	34.4
6	R	50	2.0	0.397	20.0	LOS B	2.4	17.2	0.74	1.01	34.0
Approach		140	2.0	0.397	19.2	LOS B	2.4	17.2	0.74	0.97	34.2
North: Willoughby Road north											
7	L	40	2.0	0.238	8.9	LOS A	2.5	17.5	0.59	0.33	42.4
8	T	315	2.0	0.238	2.4	LOS A	2.5	17.5	0.59	0.00	42.9
9	R	50	2.0	0.238	9.2	LOS A	2.5	17.5	0.59	0.88	42.3
Approach		405	2.0	0.238	3.9	LOS A	2.5	17.5	0.59	0.14	42.8
West: Atchison Street west											
10	L	50	2.0	0.376	17.7	LOS B	2.3	16.1	0.70	0.94	35.1
11	T	60	2.0	0.375	16.4	LOS B	2.3	16.1	0.70	0.92	35.5
12	R	35	2.0	0.376	18.1	LOS B	2.3	16.1	0.70	0.99	35.1
Approach		145	2.0	0.375	17.3	LOS B	2.3	16.1	0.70	0.94	35.3
All Vehicles		1100	2.0	0.397	7.4	NA	2.5	17.5	0.62	0.33	40.5

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Site: Ex PM + dev

Willoughby Road & Atchison Street
Existing afternoon peak hour + development
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Willoughby Road south											
1	L	40	2.0	0.194	9.1	LOS A	2.1	15.2	0.61	0.33	42.4
2	T	300	2.0	0.194	2.6	LOS A	2.1	15.2	0.61	0.00	42.8
3	R	15	2.0	0.195	9.4	LOS A	2.1	15.2	0.61	0.91	42.4
Approach		355	2.0	0.194	3.6	LOS A	2.1	15.2	0.61	0.08	42.8
East: Atchison Street east											
4	L	15	2.0	0.405	23.2	LOS B	2.3	16.4	0.81	1.03	32.3
5	T	75	2.0	0.405	21.9	LOS B	2.3	16.4	0.81	0.99	32.5
6	R	25	2.0	0.403	23.5	LOS B	2.3	16.4	0.81	1.04	32.2
Approach		115	2.0	0.404	22.4	LOS B	2.3	16.4	0.81	1.01	32.4
North: Willoughby Road north											
7	L	50	2.0	0.318	8.8	LOS A	3.3	23.6	0.59	0.32	42.4
8	T	380	2.0	0.319	2.3	LOS A	3.3	23.6	0.59	0.00	42.8
9	R	95	2.0	0.319	9.1	LOS A	3.3	23.6	0.59	0.86	42.3
Approach		525	2.0	0.319	4.1	LOS A	3.3	23.6	0.59	0.19	42.6
West: Atchison Street west											
10	L	30	2.0	0.349	19.7	LOS B	2.0	13.9	0.73	0.90	34.0
11	T	45	2.0	0.346	18.4	LOS B	2.0	13.9	0.73	0.92	34.4
12	R	40	2.0	0.348	20.0	LOS B	2.0	13.9	0.73	0.98	34.0
Approach		115	2.0	0.347	19.3	LOS B	2.0	13.9	0.73	0.94	34.1
All Vehicles		1110	2.0	0.404	7.4	NA	3.3	23.6	0.64	0.31	40.3

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Site: Ex AM + dev

Willoughby Road & Chandos Street
Existing morning peak hour + development
Signals - Fixed Time Cycle Time = 100 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Willoughby Road south											
1	L	30	2.0	0.094	19.9	LOS B	1.4	9.6	0.53	0.70	34.0
2	T	315	2.0	0.438	22.0	LOS B	13.1	93.3	0.75	0.65	31.4
3	R	25	2.0	0.438	28.6	LOS C	13.1	93.3	0.76	0.87	30.6
Approach		370	2.0	0.438	22.2	LOS B	13.1	93.3	0.74	0.67	31.6
East: Chandos Street east											
4	L	45	2.0	0.784	37.8	LOS C	26.1	186.2	0.95	0.92	27.1
5	T	695	2.0	0.783	33.9	LOS C	26.1	186.2	0.96	0.89	26.3
6	R	125	2.0	0.783	48.0	LOS D	16.0	113.8	0.99	0.95	23.6
Approach		865	2.0	0.783	36.1	LOS C	26.1	186.2	0.96	0.90	25.9
North: Willoughby Road north											
7	L	75	2.0	0.198	20.2	LOS B	2.8	19.7	0.55	0.70	33.6
8	T	460	2.0	0.779	27.0	LOS B	25.6	182.3	0.91	0.85	28.8
9	R	120	2.0	0.779	33.5	LOS C	25.6	182.3	0.91	0.92	28.6
Approach		655	2.0	0.779	27.4	LOS B	25.6	182.3	0.87	0.84	29.2
West: Chandos Street west											
10	L	100	2.0	0.317	28.2	LOS B	4.4	31.7	0.69	0.73	29.8
11	T	360	2.0	0.492	25.4	LOS B	14.8	105.3	0.81	0.70	29.9
Approach		460	2.0	0.492	26.0	LOS B	14.8	105.3	0.79	0.71	29.9
All Vehicles		2350	2.0	0.783	29.5	LOS C	26.1	186.2	0.87	0.81	28.3

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS D. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	25.9	LOS C	0.1	0.1	0.72	0.72
P3	Across E approach	53	18.0	LOS B	0.1	0.1	0.60	0.60
P7	Across W approach	53	18.0	LOS B	0.1	0.1	0.60	0.60
All Pedestrians		159	20.6				0.64	0.64

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS C. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: Ex PM + dev

Willoughby Road & Chandos Street
Existing afternoon peak hour + development
Signals - Fixed Time Cycle Time = 100 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Willoughby Road south											
1	L	30	2.0	0.152	27.5	LOS B	4.9	34.8	0.68	0.81	30.8
2	T	350	2.0	0.706	33.6	LOS C	15.8	112.7	0.90	0.78	26.4
3	R	50	2.0	0.705	44.0	LOS D	15.8	112.7	0.96	0.88	25.0
Approach		430	2.0	0.705	34.4	LOS C	15.8	112.7	0.89	0.79	26.5
East: Chandos Street east											
4	L	50	2.0	0.219	20.8	LOS B	3.1	21.8	0.56	0.75	33.7
5	T	265	2.0	0.878	44.7	LOS D	21.4	152.1	0.95	1.02	22.9
6	R	120	2.0	0.878	55.3	LOS D	21.4	152.1	1.00	1.10	21.9
Approach		435	2.0	0.878	44.9	LOS D	21.4	152.1	0.92	1.01	23.5
North: Willoughby Road north											
7	L	165	2.0	0.517	28.3	LOS B	7.0	49.7	0.71	0.75	29.7
8	T	335	2.0	0.895	50.7	LOS D	25.9	184.2	1.00	1.09	21.5
9	R	105	2.0	0.895	57.2	LOS E	25.9	184.2	1.00	1.09	21.6
Approach		605	2.0	0.895	45.7	LOS D	25.9	184.2	0.92	1.00	23.3
West: Chandos Street west											
10	L	210	2.0	0.525	25.2	LOS B	17.3	123.3	0.74	0.85	31.8
11	T	770	2.0	0.525	18.7	LOS B	17.6	125.6	0.74	0.65	33.0
Approach		980	2.0	0.525	20.1	LOS B	17.6	125.6	0.74	0.70	32.7
All Vehicles		2450	2.0	0.895	33.3	LOS C	25.9	184.2	0.84	0.84	27.0

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS E. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	18.6	LOS B	0.1	0.1	0.61	0.61
P3	Across E approach	53	25.2	LOS C	0.1	0.1	0.71	0.71
P7	Across W approach	53	25.2	LOS C	0.1	0.1	0.71	0.71
All Pedestrians		159	23.0				0.68	0.68

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS C. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: Ex AM + dev

Christie Street & Chandos Street
Existing morning peak hour + development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Christie Street south											
1	L	130	2.0	0.535	8.5	LOS A	5.2	37.1	0.72	0.76	41.2
2	T	100	2.0	0.535	7.5	LOS A	5.2	37.1	0.72	0.72	41.1
3	R	275	2.0	0.535	12.3	LOS A	5.2	37.1	0.72	0.83	39.2
Approach		505	2.0	0.535	10.4	LOS A	5.2	37.1	0.72	0.79	40.0
East: Chandos Street east											
4	L	330	2.0	0.583	8.9	LOS A	6.3	44.8	0.75	0.79	41.3
5	T	160	2.0	0.582	7.9	LOS A	6.3	44.8	0.75	0.75	41.2
6	R	70	2.0	0.583	12.7	LOS A	6.3	44.8	0.75	0.86	39.2
Approach		560	2.0	0.583	9.1	LOS A	6.3	44.8	0.75	0.79	41.0
North: Christie Street north											
7	L	25	2.0	0.347	7.9	LOS A	2.8	19.8	0.65	0.71	41.7
8	T	155	2.0	0.349	6.9	LOS A	2.8	19.8	0.65	0.67	41.7
9	R	135	2.0	0.349	12.7	LOS A	2.8	19.8	0.65	0.83	39.2
Approach		315	2.0	0.349	9.5	LOS A	2.8	19.8	0.65	0.74	40.6
West: Chandos Street west											
10	L	15	2.0	0.181	8.4	LOS A	1.3	9.4	0.65	0.72	41.7
11	T	70	2.0	0.180	7.3	LOS A	1.3	9.4	0.65	0.67	41.7
12	R	60	2.0	0.180	12.1	LOS A	1.3	9.4	0.65	0.82	39.5
Approach		145	2.0	0.180	9.4	LOS A	1.3	9.4	0.65	0.74	40.7
All Vehicles		1525	2.0	0.583	9.6	LOS A	6.3	44.8	0.71	0.77	40.6

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS A. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.
Roundabout Capacity Model: SIDRA Standard.

MOVEMENT SUMMARY

Site: Ex PM + dev

Christie Street & Chandos Street
Existing afternoon peak hour + development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Christie Street south											
1	L	60	2.0	0.435	6.3	LOS A	3.8	27.3	0.45	0.55	42.3
2	T	75	2.0	0.434	5.3	LOS A	3.8	27.3	0.45	0.48	42.6
3	R	390	2.0	0.433	10.1	LOS A	3.8	27.3	0.45	0.68	40.3
Approach		525	2.0	0.434	8.9	LOS A	3.8	27.3	0.45	0.64	40.8
East: Chandos Street east											
4	L	220	2.0	0.307	6.7	LOS A	2.4	17.3	0.50	0.60	42.3
5	T	60	2.0	0.306	5.6	LOS A	2.4	17.3	0.50	0.54	42.5
6	R	45	2.0	0.306	10.4	LOS A	2.4	17.3	0.50	0.75	40.6
Approach		325	2.0	0.307	7.0	LOS A	2.4	17.3	0.50	0.61	42.1
North: Christie Street north											
7	L	40	2.0	0.284	8.9	LOS A	2.1	15.2	0.68	0.76	41.4
8	T	140	2.0	0.284	7.9	LOS A	2.1	15.2	0.68	0.72	41.7
9	R	50	2.0	0.284	13.3	LOS A	2.1	15.2	0.68	0.87	38.9
Approach		230	2.0	0.284	9.2	LOS A	2.1	15.2	0.68	0.76	41.0
West: Chandos Street west											
10	L	30	2.0	0.238	8.6	LOS A	1.8	12.6	0.66	0.74	41.7
11	T	125	2.0	0.239	7.5	LOS A	1.8	12.6	0.66	0.70	41.8
12	R	40	2.0	0.238	12.3	LOS A	1.8	12.6	0.66	0.85	39.5
Approach		195	2.0	0.239	8.7	LOS A	1.8	12.6	0.66	0.73	41.3
All Vehicles		1275	2.0	0.434	8.5	LOS A	3.8	27.3	0.54	0.67	41.2

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS A. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.
Roundabout Capacity Model: SIDRA Standard.

MOVEMENT SUMMARY

Site: Ex AM + dev

Christie Street & Atchison Street
Existing morning peak hour + development
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Christie Street south											
2	T	555	2.0	0.328	5.2	LOS A	5.5	39.5	0.78	0.00	41.4
3	R	30	2.0	0.330	11.9	LOS A	5.5	39.5	0.78	1.05	40.9
Approach		585	2.0	0.328	5.6	LOS A	5.5	39.5	0.78	0.05	41.4
North: Christie Street north											
7	L	100	2.0	0.161	6.5	LOS A	0.0	0.0	0.00	0.79	43.3
8	T	515	2.0	0.161	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
Approach		615	2.0	0.161	1.0	LOS A	0.0	0.0	0.00	0.13	48.8
All Vehicles		1200	2.0	0.328	3.3	NA	5.5	39.5	0.38	0.09	44.9

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS A. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

SIDRA INTERSECTION

MOVEMENT SUMMARY

Site: Ex PM + dev

Christie Street & Atchison Street
Existing afternoon peak hour + development
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Christie Street south											
2	T	495	2.0	0.283	4.2	LOS A	4.0	28.2	0.72	0.00	42.0
3	R	20	2.0	0.282	10.9	LOS A	4.0	28.2	0.72	0.99	41.6
Approach		515	2.0	0.283	4.4	LOS A	4.0	28.2	0.72	0.04	42.0
North: Christie Street north											
7	L	50	2.0	0.150	6.5	LOS A	0.0	0.0	0.00	0.85	43.3
8	T	525	2.0	0.150	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
Approach		575	2.0	0.150	0.6	LOS A	0.0	0.0	0.00	0.07	49.3
All Vehicles		1090	2.0	0.283	2.4	NA	4.0	28.2	0.34	0.06	45.6

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS A. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.